New Primary Intelligence Test and its Application to Primary School Entrants in Kobe, Japan

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To Professor Hakusi T. Chiba, dedicated in gratitude and respect

Contents

I. Purpose

There are some problems which we as clinical psychologists meet, and which are of interest also to school teachers. As an

attempt to solve such problems in a general and systematic way, the members of the psychological clinic of the Child Welfare Institute planned to cooperate with the teachers who belonged to the Section of Child Study of the Association for the Study of Primary Education of Kobe City (Kōbe-si Syotō-kyoiku Kenkyukai, Zidō-kenkyu-bu).

An intelligence test was given to all the pre-school children just entering primary schools in the city of Kobe. Compulsory education begins in April after the sixth birthday according to Japanese Educational Regulations. The children due to enter in April were tested shortly before school entrance and almost all about the same time.

We planned to use the results thus obtained in the following way :

1. Class organization

One way of organizing classes on the basis of an intelligence test is to divide children into three separate groups of high, medium and low intelligence. But, in our city, this method is not adopted for various reasons, and the children are divided into classes which include uniformly every degree of intelligence. For this purpose our test results have often been used by many school authorities.

2. Comparison with school attainment

Other things being equal, attainment in school corresponds to general intelligence, and we hoped to discover such children as showed extreme discrepancy between these, especially of very poor attainment not corresponding to their intelligence. Then each teacher would be able to make use of the result of the intelligence test to help them. But at this point, we regretfully confess that it seems there is much to be done before teachers can be brought to comprehend and utilize our ideas.

3. Detection of children whose school entrance it is desirable to postpone

This was the main object of our intelligence testing at the present time, and, in this point, our plan was successful. The result will be described in detail in a later section.

4. Early detection of extremely superior children

We hope to give some stimulus to the movement for the survey and investigation of this group of extremely superior children, and the adoption of a suitable policy concerning them, in our city where such a movement is almost as much neglected as the question of retarded children. This question, also, will be discussed more in detail in a later section.

II. Construction of the test

1. Selection of the test items

There are 17,000 or more children entering the primary schools of our city on the 1st of April every year. Within the half month from January 15th to 31st, i. e. two months prior to their entrance, these children must be subjected to physical examination at each school, forty or fifty children each day. Until last year, in addition to the physical examination, a simple mental test had been given. But the mental tests adopted by different schools were divergent in their content as well as their method. Therefore it was one of the aims of Child Study that all the schools should adopt the same intelligence test. This aim came nearer and nearer to fulfilment every year, until at last 45 out of a total of 62 schools agreed to act jointly last year. We expected all the schools in our city to follow a common method this year.

Formerly we used the questions of the group intelligence test devised by the Institute for Child Study of Yokohama, and gave them individually. But this year we decided to construct an intelligence test better fitted to our purpose. From the purely scientific standpoint of exactness, it is very desirable to use the Binet test, which has already been adopted and perfectly standardized in Japan by Mr. Jitarō Suzuki; but it is not suited for our practical purposes, because we have to train teachers to master the technique, and its application takes too much time. We decided, therefore, to construct a new intelligence test, better fitted to our practical purposes on the following principles: —

(a) It should be an individual test, for a group test is unsui-

table for children of six years old.

(b) Wherever possible, each child should be examined by a number of teachers, each teacher confining himself to a particular section of the whole test.

(c) The test should be simple, and it should not take more than ten minutes to test one child.

(d) No special training in technique should be necessary. Even primary teachers who have usually little experience in testing should be able to give the test.

(e) The test should be of such nature that few children refuse to respond to it. If a test requires talking, children of this age often refuse to speak. The purpose of our test is to discover the degree of growth of the child's intelligence, not to examine defects of his speech function. For when the latter examination is necessary, it is possible to give a special test in a simple way, and we should avoid that confusion. For this reason, we preferred such test items as require pointing at, or a very simple oral answer.

(f) Direction tests should be included. Since it is very necessary for the child after entering school to be able to understand what the teachers say, over and above the simplest remarks and instructions, we have adopted some direction tests which aim at observation of this part of development.

(g) The result should have diagnostic value.

2. The sources of the test items

We adopted our test items from the following sources : —

(a) Arthur S. Otis ; Otis Group Intelligence Scale, primary examination : Forms A and B, 1920.

(b) The First Grade Intelligence Test, by the Institute of Child Study, Yokohama, 1936.

(c) Harry J. Baker ; Detroit advanced first-grade intelligence test, Form A, 1925.

(d) R. Pintner and Bess V. Cunningham ; Pintner-Cunningham Primary Mental Test, Examination : Form A, 1923.

(e) A. Gesell ; The mental growth of the pre-school child, 1928.

(a) The majority of our test items were selected from the Otis Scale. They are :

(1) Test I, Following Directions.

(2) Test III, Picture Completions.

(3) Test VI, Similarities.

From these three kinds of tests we chose thirty items. We modified also some of them and added to them seven other items; four items which we had newly devised, one from the Pintner-Cunningham Scale and two from the Detroit Scale. From these thirty-seven preliminary test items, according to the results of their practical application to the following three groups of subjects, we have chosen twenty-one for the final scale.

Group I. 53 children, 4–6 years of age, at the Ikutagawa and Hyōgo Nursery Schools, Kobe.

Group II. 12 children in the 1st and 2nd grade of the higher primary course, (namely the 7th or 8th grade), who are extremely retarded in school attainment, corresponding only to the 3rd grade or below.

Group III. 619 primary school children in the 1st, 2nd and 3rd grade of Sinyō and Hiyodorigoe Primary Schools, Kobe. About half of each grade at both schools were girls.

Groups I and II were tested individually, and group III as a group. The percentages of correct answers for each age in group I, for mental age according to the Binet test in group II, and for each grade in group III, are given in the Tables Ia and Ib.

On the basis of these results we selected 21 test items which we considered good and suitable. They are marked in the second or first column of the Tables. The basis of this selection is as follows:

(1) The percentage of correct answers should increase as age increases, and the greater and more regular the increases so much the better.

(2) The scale should be composed of test items of which some items have a great percentage passing, (easy for that age), some items moderate percentage passing, (moderate) and others small percentage passing, (difficult) (cf. Table VII). This will not make the scale too difficult or too easy.

(3) The less sex difference the better.

(b) The First Grade Intelligence Test devised by the Institute for Child Study, Yokohama, 1936.

This test had been revised and enlarged by myself at the Institute, and used several times in all the schools in Yokohama.

Table I a Percentage Passing Each Item of Tests Taken from Otis,

No. of the New Scale	Selected Tests	No. of Test	Test
			Direction Tests
		1	Pointing to the cat that has no tail. (modified)
(3)	○	2	Counting four cats. (newly added)
4	○	3	Pointing to the doll.
7	○	4	Pointing to the picture of something that can run.
13	○	5	Pointing to the picture of something that gives light and can be
		6	Pointing to the picture of something that is between the doll and
		7	Counting seven chicks. (newly added)
32	○	8	Difference between the number of chicks (7) and eggs (4).
		9	Pointing to the right hand.
		10	Counting the apples that have a leaf under them. (modified)
21	○	11	Counting the apples that are between leaves. (modified)
12	○	12	Telling the total (12) of apples and leaves. (newly added)
22	○	13	Pointing to the space that is in the large but not in the smaller
29	○	14	Pointing to the space that is in all three circles.
26	○	15	Counting seven overlapping circles.
			Picture Completion Tests
		1	A human face with the right eye missing.
		2	A fork with one of the prongs missing.
8	○	3	A dog with one of its legs missing.
		4	A table-clock with a hand missing.
19	○	5	Seven overlapping circles with a part of one circle missing.
30	○	6	A suit-case with one of the strap-holders missing.
		7	A coat with one of the button-holes missing.
		8	A pistol with the trigger missing.
11	○	9	A flying bird with one of its legs missing. (from the Pintner-Cunn-
34	○	10	A dressing-table with one of the drawer-handles missing.
		11	Trees, one without a shadow.
28	○	12	A symmetrical design with one part missing.
			Similarities Tests
		1	Fishes. (newly added)
31	○	2	Cars. (modified)
		3	Hats.
14	○	4	Fruits.
		5	Parts of human body.
9	○	6	Birds. (newly devised)
20	○	7	Cutler. (modified)
		8	Tables (from the Detroit Scale)
		9	Cross-designs.
33	○	10	Things which give light. (modified)

(boys and girls combined) in the Three Kinds Individually Administered.

Group	I (Nursery schools)			II (7th and 8th grade)
Range of Ages	C.A. 4:0–4:11	C.A. 5:0–5:11	C.A. 6:0–6:9	M.A. 8:9–11:0
Average Age	4:7	5:6	6:4	M.A. 9:4 (IQ 77)
No. of Cases	13	24	16	12
	38	63	81	100
	31	50	88	100
	38	71	81	100
	38	42	69	100
picked up.	15	4	13	100
the candle.	31	21	44	100
	15	46	88	92
	0	8	44	75
	8	33	31	33
	0	0	0	33
	0	0	6	50
	0	8	31	92
circle.	8	8	25	17
	15	0	6	50
	8	29	69	75
	8	25	50	100
	8	50	63	100
	15	25	63	100
	23	13	13	100
	15	8	13	67
	15	0	19	33
	0	4	6	50
	23	25	19	42
ingham Scale)	15	25	44	100
	0	4	0	17
	0	8	13	0
	0	0	0	50
	15	46	88	92
	8	29	75	92
	8	13	44	100
	15	4	6	25
	0	21	19	33
	0	17	63	83
	23	13	44	8
	8	13	44	50
	8	17	50	83
	0	0	6	8

Table I b (Group III) Percentage Passing Each Item in the Three Kinds of Tests Taken from Otis, Administered to a Group.

Selected Tests	Group	Boys			Girls			Both sexes		
	Grade	I	II	III	I	II	III	I	II	III
	Average Age	6:9	7:9	8:9	6:9	7:9	8:9	6:9	7:9	8:9
	No. of Cases	97	101	113	101	109	103	193	210	216
	Direct. Tests									
	1	84	91	98	92	91	100	88	91	100
○	2	69	81	90	73	89	96	71	85	93
○	3	38	74	94	64	78	93	52	76	94
○	4	58	74	80	74	71	88	66	72	84
○	5	29	63	81	31	63	79	30	63	80
	6	36	49	86	54	55	76	45	52	81
	7	63	78	87	81	83	62	72	80	75
○	8	28	55	53	21	49	63	24	52	58
	9	34	32	53	24	33	48	29	32	50
	10	8	19	32	17	16	44	13	17	38
○	11	3	30	36	22	34	31	13	32	34
○	12	24	51	58	43	51	38	33	51	49
○	13	27	26	28	25	29	37	26	28	32
○	14	0	5	18	3	6	19	2	5	19
○	15	26	54	73	34	54	68	30	54	70
	Pict. Comp. Tests									
	1	73	74	81	78	74	81	76	74	81
	2	73	90	95	74	86	94	74	88	94
○	3	77	89	96	72	83	93	75	86	95
	4	52	83	85	49	69	75	50	76	80
○	5	31	44	68	37	50	65	34	47	67
○	6	37	43	66	35	42	60	36	42	63
	7	15	19	37	11	17	19	13	18	29
	8	55	74	92	20	22	56	37	47	75
○	9	66	76	92	58	72	74	62	74	83
○	10	19	16	38	10	10	17	14	13	28
	11	21	33	25	17	21	27	19	27	26
○	12	21	23	47	12	30	45	16	27	46
	Similarities Tests									
	1	57	75	77	54	74	65	56	75	71
○	2	46	65	71	41	60	57	43	62	64
	3	43	52	70	38	54	60	40	53	65
○	4	11	27	34	11	21	29	11	24	31
	5	11	8	24	12	14	21	12	11	23
○	6	35	59	66	29	50	55	32	54	61
○	7	16	36	41	19	17	23	18	26	32
	8	31	32	45	26	29	33	28	30	39
	9	28	49	62	25	42	38	26	45	50
○	10	6	6	15	4	3	8	5	4	12

In Kobe, also, this test had been used by some 40 primary schools every year since 1938 for the children about to enter school. We selected eleven test items from it, after consideration of the results as is shown in Table II.

Table II The Yokohama First Grade Intelligence Test

Test		% / School / C. A. / N.	Percentage Passing							Adoption	No. of the New Scale
			Itayado			Waka-miya	Untyū	Total of Differences	Itayado Average % A+B/2		
			6:10-6:8 (A)	6:1-5:11 (B)	A–B	A–B	A–B				
			91	100	191	68	97		191		
Number	I	1	100	100	0	2	2	4	100		
		2	96	90	6	10	12	28	93	○	(5)*
		3	88	72	16	7	8	31	80		
	II	1	77	66	11	5	11	27	72		
		2	66	61	5	14	9	28	64		
		3	57	49	8	9	−2	15	53		
Similarities	III	1	98	97	1	5	0	6	98	○	6
		2	81	73	8	0	29	37	77		
		3	70	53	17	10	13	40	62	○	25
		4	64	50	14	2	10	26	57	○	17
		5	33	36	−3	−1	7	3	35		
		6	67	67	0	22	11	33	67		
Picture Construction	IV	1	55	52	3	15	15	33	54		
		2	56	58	−2	−26	4	−24	57		
		3	45	45	0	18	17	35	45	○	24
		4	84	61	23	2	14	39	73		
		5	66	49	17	12	4	33	58	○	16
		6	27	23	4	7	13	24	25	○	27
Picture Completion	V	1	93	90	3	1	7	11	92	○	18△
		2	81	76	5	17	13	35	79	○	10
		3	71	65	6	18	0	24	68		
		4	60	45	15	20	4	39	53	○	15
		5	42	37	5	5	13	23	40		
		6	42	34	8	8	6	22	38	○	23
◇	VI		47	30	17	10	12	39	39		

Note: * In our New Scale we used flags instead of books.

△ In the Yokohama Scale the Binet human face lacking the right eye as an example immediately precedes this test. Therefore the percentage (92%) passing the test in this scale is much greater than that (48%) in our New Scale.

We selected three schools, viz., Itayado, Wakamiya and Untyū, and examined their results in this test for the last year. Eleven test items were selected from it according to the following criteria.

(1) The difference between the percentages of correct answers of two age groups, one including the chronological ages 6 : 10–6 : 8 and the other 6 : 1–5 : 11, should be positively great, and the three schools should show the same tendency.

(2) The number of difficult, moderate and easy test items (indicated by a percentage passing) of our new scale should be suitable for adding to the test items selected from the Tables Ia and Ib.

(c) Other test items.

(1) Test no. 9 (classification of birds).
Test no. 20 (classification of cutlery).

These items suggested by Baker's test were modified to agree with the form of Otis's "Similarities test." (cf. Tables Ia and Ib).

(2) Test no. 11 (a flying bird) from the Pintner-Cunningham Scale was added as a completion test. (cf. Tables Ia and Ib).

(3) Test no. 1 (×).
Test no. 2 (△).

Both were selected as the test of minimum limit of motor ability necessary for entering school, and adopted from Gesell's result.

The above 34 items, which we decided to adopt as our new scale, were arranged according to the degree of difficulty, as indicated by the percentage of children successfully solving each problem, and grouped as Test I having 4 items, Tests II, III, IV, V and VI, each of 6 items.

3. The Tentative Standardization of the Scale

The complete standardization of the scale had to be postponed until it could be applied to the entire group of children who were to enter schools this year.

However, as it was necessary to use the norm at once to avail ourselves of the result of the scale this year, we decided to make a tentative norm.

We tried to standardize the new scale tentatively by applying the Binet Test and our new scale to the group of children at the same time. The tests were given in December, 1940, to the Egeyama Kindergarten children who were going to enter primary schools

on April 1st, 1941. The correlation between them is shown in Table III, and its coefficient r is 0.639 ± 0.0515.

Table III Correlation between the Binet Scale and the New Scale with the Children of the Egeyama Kindergarten. (December, 1940.)

Binet Scale		New Scale
Score	M.A.	Score
34	8—0	23
32	7—6	22
31	7—4	18
30	7—2	20
30	7—2	19
29	7—0	25
29	7—0	22
29	7—0	21
29	7—0	19
28	6—10	24
28	6—10	23
28	6—10	21
28	6—10	20
28	6—10	20
28	6—10	20
28	6—10	19
28	6—10	18
28	6—10	18
28	6—10	15
27	6—8	23
27	6—8	21
27	6—8	21
27	6—8	20
27	6—8	19
27	6—8	17
27	6—8	16
27	6—8	16
26	6—6	20
26	6—6	19
26	6—6	18
26	6—6	17
26	6—6	15
26	6—6	15

Binet Scale		New Scale
Score	M.A.	Score
25	6—3	21
25	6—3	19
25	6—3	18
25	6—3	15
25	6—3	14
25	6—3	13
25	6—3	11
24	6—0	21
24	6—0	20
24	6—0	16
24	6—0	15
24	6—0	14
23	5—10	17
23	5—10	17
23	5—10	16
23	5—10	14
23	5—10	13
23	5—10	10
22	5—8	17
21	5—6	18
20	5—0	13
20	5—0	12
20	5—0	12
18	4—10	8
16	4—7	14
14	4—4	8
11	3—10	10
Total 60 cases Correlation betw. both Scales $\gamma = 0.639 \pm 0.0515$		

With 46 children who have Binet M.A. between 7 : 0 and 5 : 10 in Table III, M and σ of the two tests are shown in Table IV.

Table IV M. and σ of the Two Tests for 46 Children with M. A. 7 : 0–5 : 10 by the Binet Test.

Test	M.	σ
Binet M. A.	77.6 mm. (6 : 6)	4.556 (4.56)mm.
New Scale Score	17.96 (18)	3.333 (3.33)

On the basis of this result and calculation by the following converting formula, the score of the new test can be translated into M. A..

The formula for Converting the New Test Score into the Binet M. A.

M_a = Average of Binet M.A.
$\sigma_a = \sigma$,,
M_b = Average of New Test
$\sigma_b = \sigma$,,
X_b = Score ,,
$M.A._b$ = the converted M.A. of New Test

We have

$$M.A._b = (X_b - M_b)\frac{\sigma_a}{\sigma_b} + M_a$$
$$= (X_b - M_b) \times \frac{4.56}{3.33} + 78$$
$$= (X_b - 18) \times 1.37 + 78$$

Table V Tentative Norms for the New Scale

Score	Mental Age		Grade	
	m.	yr.-m.		
34	100	8—4	A	Very superior
33	99	8—3		
32	97	8—1		
31	96	8—0		
30	94	7—10	B^+	Superior
29	93	7—9		
28	92	7—8		
27	90	7—6		
26	89	7—5	B^-	
25	88	7—4		
24	86	7—2		
23	85	7—1		
22	84	7—0		

Table V Continued

Score	Mental Age		Grade	
	m.	yr.-m.		
21	82	6—10		
20	81	6—9		
19	79	6—7		
18	**78**	**6—6**	C	Average
17	77	6—5		
16	75	6—3		
15	74	6—2		
14	73	6—1		
13	71	5—11		
12	70	5—10		
11	68	5—8	D^+	
10	67	5—7		
9	66	5—6		Inferior
8	64	5—4		
7	63	5—3	D^-	
6	62	5—2		
5	60	5—0		
4	59	4—11		
3	57	4—9		
2	56	4—8	E	Very inferior
1	55	4—7		
0	53	4—5		

III. The results

1. The Distribution of the Scores

On January 11th, 1941, we requested one teacher from each of the 62 primary schools of our city to assemble at Irie Primary School, where a conference was held to discuss the method of applying the new scale. The test was administered between January 15th and 31st. In Tables VIa, VIb and VIc, the schools are arranged in the order of the median scores of total children of each school.

The distribution curves of scores for all the schools are shown on Graphs I and II.

Table VI a Frequency Distribution of the Scores

Score \ School	1	2	3	4	5	6	7	8	9	10	11	12	13
34		1								1			
33	2	1				2							
32	5		1	2	1		3		2	2			1
31	5	1	1		1	3				1	1		
30	8	2	4	3	5	5	1	1	1	1			1
29	15	5	7	3	1	3	7	2	3	3		1	2
28	17	9	7	1	6	7	4	3	1	8	3	4	3
27	19	6	5	4	9	10	5	4	6	5	3	4	7
26	19	9	9	10	7	12	9	4	6	5	7	5	3
25	22	11	8	8	6	9	6	6	15	3	4	5	6
24	21	13	11	10	6	13	8	3	9	11	5	14	7
23	17	6	17	5	10	9	11	9	10	8	13	15	7
22	17	7	7	10	8	12	14	2	13	13	16	8	12
21	15	15	11	3	6	7	16	10	10	5	12	10	8
20	13	8	12	12	9	16	13	9	24	10	13	14	7
19	12	11	6	4	8	9	9	8	16	11	13	12	8
18	8	6	8	7	3	6	12	3	20	5	7	10	5
17	4	10	7	4	8	7	13	6	9	7	9	14	14
16	4	5	7	1	3	6	10	9	7	8	6	9	9
15	2	4		2	8	8	10	3	9	8	5	12	6
14	3	4		2	7	5	5	2	9	5	4	6	1
13	4	2	2	2	6	4	4		9	8	1	2	1
12		2	1	4	4	6	4	1	2	4	3	5	1
11		1			5	3		1	2	5	2	3	2
10					2	3	2			2	2	2	1
9	2		1		2	3	1		5	4	3		1
8			1		1	2	2				3		1
7	1	1		1		1	2	1		1			
6			1		1		2						2
5	1		1			1			1				3
4						1	1	1		1			
3					1								
2				1						1			
1													
0													
N.	236	140	135	99	134	173	174	88	189	146	135	155	119
Q_3	27	25	26	25	25	25	23	24	23	19	23	23	24
Mi	24	22	23	22	20	21	20	21	20	16	20	20	20
Q_1	21	19	19	19	15	16	17	17	17	13	17	17	17

of Our New Scale for Each School in Kobe. Boys.

14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
									1								
				1										1			
1													1				
				1												1	
4	1			5		1	1		1	1		2	2		2		
2	5			3	1	4	4		1			1	1	1	1	1	
4	3		1	3	2	6	1		2		1	1		3	1	1	
7	2		1	7	2	3	5	1	7	3	1	5	3	1	2	2	
8	4		2	9	3	7	4		4	4	6	3	5	2	4	4	
6	9		3	12	5	4	7	3	7	4	4	2	5	4	2	5	
4	14	2	3	13	9	11	8	3	5	4	4	8	7	1	5	3	
10	15		3	9	13	8	14	6	10	4	7	11	11	7	8	3	
11	9		3	13	5	18	15	2	9	6	15	10	9	6	7	13	1
6	17		7	14	12	13	14	4	11	5	7	12	11	8	12	9	
12	28	1	1	21	8	13	18	4	11	10	10	19	11	7	2	14	
18	23	1	3	12	8	23	17	8	5	8	11	12	8	12	12	5	
7	24	1	8	9	10	11	10	5	8	9	10	16	8	5	13	11	
8	17	1	5	13	7	24	11	5	14	3	11	16	7	6	6	5	1
10	14	1	1	14	9	15	14	5	13	5	13	12	8	6	12	4	
11	11	2	4	10	4	19	13		3	4	8	11	11	6	8	4	
7	7	1	1	10	5	6	8	4	11	7	7	7	8	6	13	9	
5	8		1	5	6	9	11	3	3	8	6	13	7	3	7	4	
3	10		2	4	1	9	13	3	5	4	8	4	8	6	4	13	
3	4			3	3	6	6	1	5		3	5	3	3	4	3	
3	2		1	2		4	5	1	4	2	2	3	4	2	3	5	
3	5		1	3	4	1	5	2			1	1	3	2	1	2	
1	3			2	1	4	4				2		3			2	
			1	3	1				1	1			1		1	2	
				1			2	1	1		1	1	1				
1						1				1		1	1		2	1	
						1	1	1					2	1		1	
													1	1	1		
1				1		1							1	1			
	3			1													
	1			1			1							1			
156	239	10	52	205	119	222	212	62	142	93	138	176	151	102	133	127	2
23	22		23	24	23	22	22	21	23	22	22	21	22	22	21	22	
19	19	18	19	20	20	19	19	18	19	19	18	18	18	19	18	18	20
16	16		17	16	16	15	14	14	16	14	15	15	14	14	14	13	

Table IV a

Score \ School	32	33	34	35	36	37	38	39	40	41	42	43	44
34							1						
33													
32	1									1	1		
31			1			1						1	
30		1			1				1				
29	2	2	1	1	3	1						1	
28	1	3	2		3	2	2		1		1	1	
27	2	1	3	3		4	1			1	2	1	1
26		3	6	5	4	1	5		2	6	3	3	5
25	2	3	6	1	5	3	2		1	4	3	3	2
24	1	4	9	5	7	6	6		6	1	5	7	5
23	3	10	5	3	8	8	6		5	4	2	7	5
22	4	14	9	3	6	11	11	2	7	5	5	9	3
21	10	6	12	3	14	15	5	2	3	3	13	13	8
20	6	10	6	11	9	12	14	1	6	10	9	17	8
19	5	9	9	6	10	10	10	1	6	9	3	13	3
18	7	10	9	7	13	11	15		6	10	10	17	6
17	10	13	16	4	16	12	8	2	5	6	10	17	8
16	7	10	14	7	13	13	10		9	7	8	26	10
15	11	12	13	7	12	12	13	1	4	6	9	15	2
14	6	7	10	8	7	5	4	1	7	6	7	9	7
13	6	7	9	11	8	10	14		2	10	4	10	9
12	5	3	2	7	9	6	7	1	13	7	6	8	7
11	3	6	6	9	12	4	1	1	5	3	10	15	7
10	1	1	5	3	3	6	2		4	4	9	3	1
9		1	5	4	9	9	2	1		2	7	6	2
8	2	1	2	1	1	3	1		1		3	3	
7			2	1	1		2	1	5	3	2	5	1
6		3	1		1		2	1	1				1
5	1			1		1						1	1
4	1		3	1		1					1	4	
3			1							1	1	2	1
2					1					2		1	
1					2						1		
0										1			2
N.	97	140	167	112	178	167	144	15	100	112	135	218	105
Q_3	20	22	21	20	21	21	21	21	21	20	21	20	21
Mi	17	18	17	16	17	18	18	17	16	17	17	17	17
Q_1	14	15	14	13	13	14	15	11	12	13	13	13	13

Continued

45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	Total
															4
1															8
				1				1							24
1	1														20
	1							1				1	1		59
	2			2		1		1	1						95
			1		2								1		122
		1	1	2		2		1	1	2	1	2			171
1			2	4	3	1		1	1	2			2	2	236
	4	2	2	5	2	5	4	4	3	2		1	2		262
4	7	2	2	6	1	6	4	3	3	4	6	3	4		352
2	4	6	5	9		6	6	6	5	4	3	4	3	1	406
8	9	6	9	10	6	7	5	7	3	5	3	4	3	1	466
6	7	5	13	19	5	10	6	12	5	8	9	11	3	2	518
5	9	6	14	10	8	6	14	12	4	10	7	8	7	4	593
8	11	8	12	21	12	11	10	9	8	10	9	6	6	2	550
10	12	5	20	16	8	14	14	15	14	8	9	11	9	6	557
4	14	9	12	22	20	16	16	15	15	13	10	12	5	7	589
6	13	14	16	21	10	13	12	18	11	15	15	14	9	4	565
5	8	3	19	22	18	12	19	16	16	15	13	15	3	5	512
11	9	5	15	22	15	8	15	24	21	10	14	10	9	5	447
2	8	11	16	13	10	16	11	11	15	9	14	19	6	2	407
3	4	8	12	19	12	9	9	13	12	13	8	10	3	5	355
1	6	4	6	12	7	7	9	9	10	7	12	17	6	5	276
3	9	5	9	12	9	8	7	12	15	14	6	7	5	6	226
	3	1	5	7	8	8	12	9	10	5	7	9	6	7	201
2	5	2	2	1	1	2	5	5	2	5	7	4	4	3	100
2	3		6	7	1	1	3	5		6	5	9	2	1	93
1				4	2			2	1	2	1	4	5	2	48
2	1	1		3		2		1			2	3	4	2	41
							1	2		2	1	1	1	1	31
			1	1	2					2	1		1	2	20
	1		1		1		1					1	1		17
			1	1									2		11
	1			2		1		1		1		1			14
88	152	104	202	274	163	172	183	216	176	174	163	187	113	75	8,396
21	20	20	19	19	18	21	19	19	18	19	18	18	19	17	
18	17	16	16	16	15	17	15	15	15	15	15	14	15	14	
14	13	13	13	12	12	13	12	12	12	11	11	11	10	10	

Table VI b Frequency Distribution of the Scores

Score \ School	1	2	3	4	5	6	7	8	9	10	11	12	13
34							1						
33	2												1
32	4	3	1	1	1	2			1				
31	3	1	1	1		2	4			1			1
30	6		1	1	6	1		1	1	3		1	
29	8	3		3	4	3	2		3	2		1	2
28	10	7	2	6	1	5	4	1	2	6	1	3	2
27	13	5	4	5	3	6	7	1	6	2	2	4	6
26	20	5	4	4	10	11	7	2	7	6	3	5	5
25	14	8	5	8	10	7	6	5	9	8		6	4
24	23	8	7	4	11	12	7	3	11	8	2	4	3
23	13	16	5	10	5	10	8	4	10	12	13	8	10
22	17	12	10	8	13	14	5	7	18	10	10	3	8
21	21	8	7	15	9	17	8	6	15	8	6	9	3
20	9	10	10	7	11	23	6	9	10	12	11	12	6
19	11	9	7	8	12	11	8	5	14	6	15	3	9
18	11	9	9	11	13	11	13	6	7	7	6	8	7
17	2	5	9	3	5	7	10	4	12	6	5	11	9
16	9	9	7	7	8	5	9	5	13	5	5	7	11
15	3	3	2	3	2	7	6	2	8	13	8	6	5
14	2	5	5	1	1	9		1	11	8	5	10	4
13	3	1	2	3	1	11	6	2	4	10	2	5	7
12	1	1	2	1	3	3	2	3	2	7	2	5	6
11		5		2		9	4	2	7	4	5	6	3
10				3		2	4		7	5	2		4
9			1		1	1	1	1	1	3	3	1	4
8			1	1		1	3			3	2	1	1
7		1	2	2	1	2	1	1	1				1
6		1		1	1	2			1	2			2
5				1			2		2	2			2
4					1		1						
3		1											1
2				2									
1													
0													
N.	205	136	104	122	133	194	135	71	183	159	108	119	127
Q_3	26	24	23	24	25	24	24	22	23	23	22	23	23
Mi	23	22	20	21	21	20	19	20	20	19	19	18	18
Q_1	20	18	17	18	18	16	16	17	16	14	15	15	13

of Our New Scale for Each School in Kobe. Girls.

14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	1																
				1													
								1									
				1		2											
2	2							1						1			
1	2			1		3			4					2	1	1	
2	2			3	1	1			4	1	1		2		2	1	
	1		1	4	1	1	2	1	1	1	3	3	4	1	2	1	
3	4		3	1	3	5	8	4	4	3	1	4		3	1	1	
10	5		1	6	2	5	10	5	4	2	4	4	5	2	4	2	
13	12	1	1	5	4	6	8	4	3		8	3	8	5	3	1	
6	10		5	10	9	10	16	2	8	1	3	7	3	1	5	5	
15	22	2	6	12	7	10	10	5	6	3	5	7	6	8	9	5	
13	15	1	4	7	9	13	15	4	9	6	7	7	6	5	6	7	
12	11	1	6	12	8	15	19	5	7	7	5	11	8	9	10	6	
13	18	1	5	18	8	16	18	4	11	7	7	10	8	9	11	10	1
13	23	1	5	13	14	13	14	11	11	5	17	14	11	10	11	5	
13	21		2	11	13	19	25	5	12	5	8	15	9	7	6	7	
7	14		6	16	14	8	14	4	9	8	11	13	7	10	14	3	
15	10		5	14	1	15	10	2	15	9	12	9	9	9	8	6	
6	10		9	9	5	10	9	6	7	6	7	12	10	9	6	4	
8	7		3	10	8	9	16	3	13	7	6	5	10	5	5	6	
6	4		2	8	6	8	6	4	4	2	6	6	5	5	9	5	
6	5		1	10	5	5	7	2	6		4	4	4	3	3	2	
3	4			11	2	2	4		4	3	1	5	4	3	3	2	1
2	6			4	2	6	4	2	7		1	3	2	3	1	4	
	3		1	4	2	4			3	1	4	3	2	1	2		
1				2		1		2	2				2	1	1	1	
				3	2		3	2					3		1	3	
				1		3	2		2	1		1	3		2	1	
	2			1		1	2		3				1				
						1					1					2	
									1			1	2		1	1	
									1		1					2	
									1							1	
170	214	7	66	198	126	192	222	79	162	78	123	147	134	112	127	95	2
22	22		22	21	21	21	21	22	21	20	21	20	21	20	21	21	
19	18	21	18	17	18	18	18	18	17	18	17	17	17	17	18	17	15
15	15		15	13	14	14	15	15	13	14	14	14	13	14	14	12	

Table VI b

Score \ School	32	33	34	35	36	37	38	39	40	41	42	43	44
34													
33							1						
32													
31					1								
30	1											1	
29			1		3	1						1	
28			1		3	1	2		1		1	1	
27	1		1		1	2	1	1	1	3	2	2	1
26	1		2	1	1	4	1	1	2		1	1	
25	3	3	2		5	4	3		1	5	3	3	1
24	1	4	4	5	7	4	4	1	1	5		3	3
23	7	9	11	6	7	2	7	3	5	3	4	4	3
22	5	6	6	5	7	6	3	2	3	4	4	10	4
21	5	8	8	13	5	6	10	2	3	1	5	8	8
20	3	9	10	3	9	7	6	3	10	5	6	12	17
19	5	5	8	9	8	15	14	1	8	5	7	11	7
18	5	12	12	9	6	12	6		14	6	15	6	9
17	8	5	19	6	12	10	16	3	11	7	8	14	9
16	8	5	11	12	16	9	12	3	7	6	6	12	14
15	13	7	14	5	12	10	10	1	5	5	8	16	5
14	8	9	8	5	7	11	10		8	5	3	15	11
13	3	7	11	5	11	7	6	1	9	4	9	11	9
12	9	9	8	4	12	14	11	1	7	8	5	6	4
11	2	6	3	4	10	9	8	2	5	3	5	10	5
10	5	5	9	3	7	4	7	1	2		3	11	5
9	1	7	3		4	5	1		1	3	10	9	4
8		2	1	2	4	1	3		2	1	1	3	1
7	1	5	1	2	1	2	1	1	1	3	1	4	1
6		1	2	1		2	1	2	1	2	1	2	
5	2					1			1			2	
4	2				1					3		2	
3			1							1			1
2			1		1								
1			1							1		1	
0		1			2					1		1	
N.	99	125	159	100	163	149	144	29	109	90	108	182	122
Q_3	20	20	20	21	20	20	20	22	20	20	19	20	20
Mi	16	16	17	18	16	16	17	17	17	16	17	15	17
Q_1	13	12	13	14	12	12	13	12	13	12	13	12	14

Continued

45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	Total
															2
															5
															14
	1							1							20
										1					30
				2			1	1							56
				3		1	1	1			1			1	88
	2			3	1		1	1	2		1		1	1	120
3	1	2	2	3				1							164
2	1		2	5	2	3		1	1		1		1		213
1	3	3	2	4	1	4		3	2	2		1	1		257
3	7	3	5	12	6	3	7	4	2	2	3	6	2	2	363
2	6	1	11	14	2	3	4	3	5	6	2	3			400
3	10	2	11	12	6	6	7	12	6	2	2	5	2	1	435
5	7	2	11	18	8	9	5	6	5	5	2	5	2	2	480
4	6	6	12	16	5	9	6	15	6	8	9	1	2	2	503
11	13	2	6	20	20	6	16	13	9	11	9	9	5	5	576
4	12	3	20	22	11	12	14	11	9	13	11	13	1	5	555
4	8	9	17	21	15	10	12	18	13	10	14	16	5	5	556
7	9	10	16	29	8	18	24	17	9	10	9	13	5	3	515
5	9	11	11	24	17	10	11	18	18	10	15	15	9	7	477
7	14	8	18	22	7	11	9	17	16	13	6	18	4	3	444
8	11	7	10	18	9	12	11	14	21	11	15	12	9	5	395
3	9	4	16	13	4	13	16	13	4	13	8	11	9	4	326
4	6	4	8	11	5	7	5	8	15	12	8	10	8	5	257
4	4	3	4	13	4	10	7	11	9	9	10	13	7	6	226
5	5	1	7	7	2	3	5	10	1	8	9	9	8	3	147
5	7	1	4	3	1	3	8	8		9	5	8	5	4	120
	4	2	3	5	2	3	1	5		2	4	1	1	3	78
2	1	1	2	4	2	2				6	2	2	1	2	58
	3			2		1		2		6	1	2	3	1	41
1				3				2		2	2	1	1	1	22
1	1	1	1								1			1	16
	2			1									1		11
							1			1		1		1	11
94	162	86	199	310	138	159	172	216	153	172	150	175	93	73	7,981
18	19	17	19	19	18	18	18	18	18	17	17	16	15	17	
15	15	15	15	16	16	15	15	14	14	13	14	13	12	13	
11	11	12	12	12	13	11	11	11	12	9	10	10	9	9	

Table VI c Frequency Distribution of the Scores of Our

Score \ School	1	2	3	4	5	6	7	8	9	10	11	12	13
34		1					1			1			
33	4	1				2							1
32	9	3	2	3	2	2	3		3	2			1
31	8	2	2	1	1	5	4			2	1		1
30	14	2	5	4	11	6	1	2	2	4		1	1
29	23	8	7	6	5	6	9	2	6	5		2	4
28	27	16	9	7	7	12	8	4	3	14	4	7	5
27	32	11	9	9	12	16	12	5	12	7	5	8	13
26	39	14	13	14	17	23	16	6	13	11	10	10	8
25	36	19	13	16	16	16	12	11	24	11	4	11	10
24	44	21	18	14	17	25	15	6	20	19	7	18	10
23	30	22	22	15	15	19	19	13	20	20	26	23	17
22	34	19	17	18	21	26	19	9	31	23	26	11	20
21	36	23	18	18	15	24	24	16	25	13	18	19	11
20	22	18	22	19	20	39	19	18	34	22	24	26	13
19	23	20	13	12	20	20	17	13	30	17	28	15	17
18	19	15	17	18	16	17	25	9	27	12	13	18	12
17	6	15	16	7	13	14	23	10	21	13	14	25	23
16	13	14	14	8	11	11	19	14	20	13	11	16	20
15	5	7	2	5	10	15	16	5	17	21	13	18	11
14	5	9	5	3	8	14	5	3	20	13	9	16	5
13	7	3	4	5	7	15	10	2	13	18	3	7	8
12	1	3	3	5	7	9	6	4	4	11	5	10	7
11		6		2	5	12	4	3	9	9	7	9	5
10				3	2	5	6		7	7	4	2	5
9	2		2		3	4	2	1	6	7	6	1	5
8			2	1	1	3	5			3	5	1	2
7	1	2	2	3	1	3	3	2	1	1			1
6		1	1	1	2	2	2		1	2			4
5	1		1	1		1	2		3	2			5
4					1	1	2	1		1			
3		1			1								1
2				3						1			
1													
0													
N.	441	276	239	221	267	367	309	159	372	305	243	274	246
Q_3	27	25	25	25	25	24	24	23	23	23	22	23	23
Mi	24	22	21	21	21	20	20	20	20	20	20	19	19
Q_1	21	18	18	18	17	16	16	17	16	15	16	16	16

New Scale for Each School in Kobe. Both Sexes Combined.

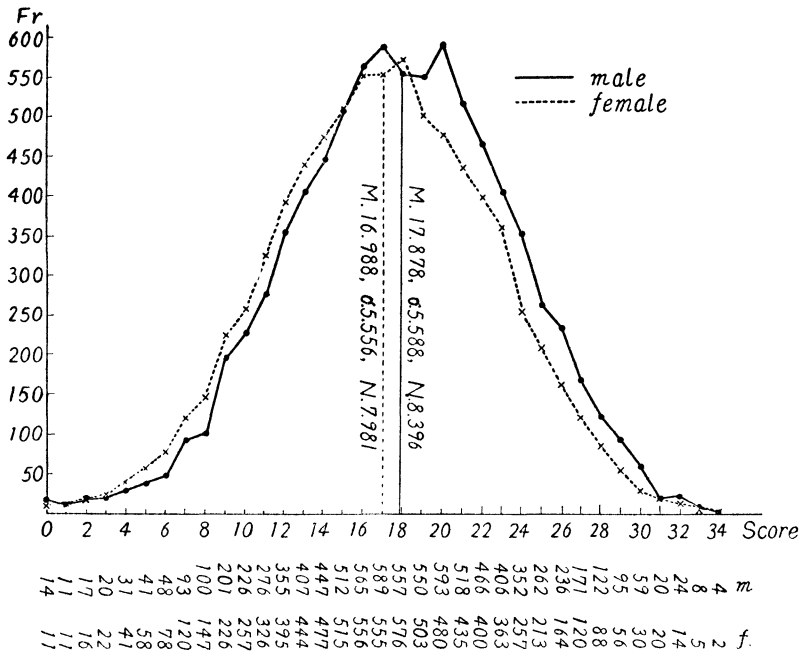
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	1								1								
				2										1			
1								1					1				
				2		2										1	
6	3			5		1	1	1	1	1		2	2	1	2		
3	7			4	1	7	4		5			1	1	3	2	2	
6	5		1	6	3	7	1		6	1	2	1	2	3	3	2	
7	3		2	11	3	4	7	2	8	4	4	8	7	2	4	3	
11	8		5	10	6	12	12	4	8	7	7	7	5	5	5	5	
16	14		4	18	7	9	17	8	11	6	8	6	10	6	6	7	
17	26	3	4	18	13	17	16	7	8	4	12	11	15	6	8	4	
16	25		8	19	22	18	30	8	18	5	10	18	14	8	13	8	
26	31	2	9	25	12	28	25	7	15	9	20	17	15	14	16	18	1
19	32	1	11	21	21	26	29	8	20	11	14	19	17	13	18	16	
24	39	2	7	33	16	28	37	9	18	17	15	30	19	16	12	20	
31	41	2	8	30	16	39	35	12	16	15	18	22	16	21	23	15	1
20	47	2	13	22	24	24	24	16	19	14	27	30	19	15	24	16	
21	38	1	7	24	20	43	36	10	26	8	19	31	16	13	12	12	1
17	28	1	7	30	23	23	28	9	22	13	24	25	15	16	26	7	
26	21	2	9	24	5	34	23	2	18	13	20	20	20	15	16	10	
13	17	1	10	19	10	16	17	10	18	13	14	19	18	15	19	13	
13	15		4	15	14	18	27	6	16	15	12	18	17	8	12	10	
9	14		4	12	7	17	19	7	9	6	14	10	13	11	13	18	
9	9		1	13	8	11	13	3	11		7	9	7	6	7	5	
6	6		1	13	2	6	9	1	8	5	3	8	8	5	6	7	1
5	11		1	7	6	7	9	4	7		2	4	5	5	2	6	
1	6		1	6	3	8	4		3	1	6	3	5	1	2	2	
1			1	5	1	1		2	3	1			3	1	2	3	
				4	2		5	3	1		1	1	4		1	3	
1				1		4	2		2	2		2	4		4	2	
	2			1		2	3	1	3				3	1		1	
						1					1		1	1	1	2	
1				1		1			1			1	3	1	1	1	
	3			1					1		1					2	
	1			1			1		1					1		1	
326	453	17	118	403	245	414	434	141	304	171	261	323	285	214	260	222	4
23	22	22	22	22	22	22	22	22	22	21	21	21	22	21	21	21	
19	19	19	19	19	18	18	18	18	18	18	18	18	18	18	18	18	18
15	16	16	15	15	16	15	15	14	14	15	15	15	13	14	14	13	

Table IV c

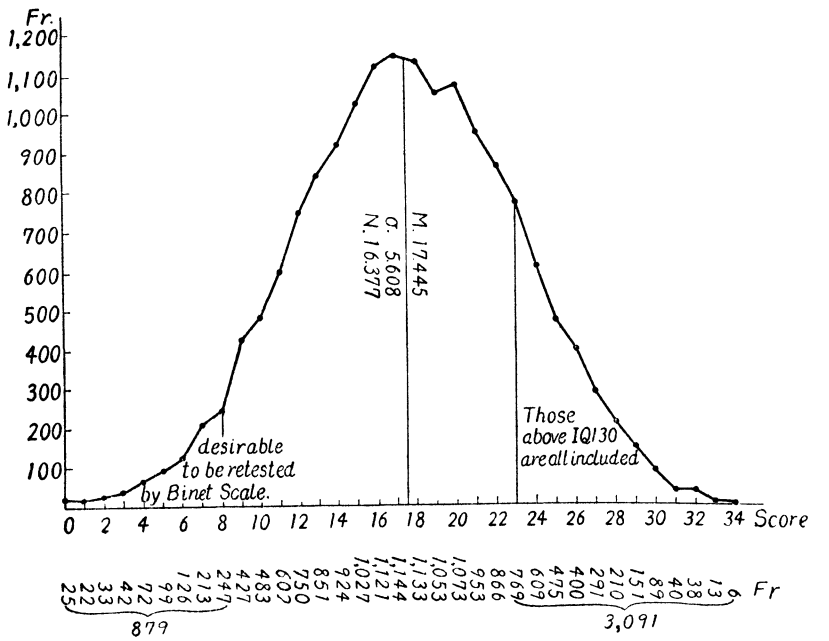
Score \ School	32	33	34	35	36	37	38	39	40	41	42	43	44
34							1						
33							1						
32	1									1	1		
31			1		1	1						1	
30	1	1			1				1			1	
29	2	2	2	1	6	2						2	
28	1	3	3		6	3	4		2		2	2	
27	3	1	4	3	1	6	2	1	1	4	4	3	2
26	1	3	8	6	5	5	6	1	4	6	4	4	5
25	5	6	8	1	10	7	5		2	9	6	6	3
24	2	8	13	10	14	10	10	1	7	6	5	10	8
23	10	19	16	9	15	10	13	3	10	7	6	11	8
22	9	20	15	8	13	17	14	4	10	9	9	19	7
21	15	14	20	16	19	21	15	4	6	4	18	21	16
20	9	19	16	14	18	19	20	4	16	15	15	29	25
19	10	14	17	15	18	25	24	2	14	14	10	24	10
18	12	22	21	16	19	23	21		20	16	25	23	15
17	18	18	35	10	28	22	24	5	16	13	18	31	17
16	15	15	25	19	29	22	22	3	16	13	14	38	24
15	24	19	27	12	24	22	23	2	9	11	17	31	7
14	14	16	18	13	14	16	14	1	15	11	10	24	18
13	9	14	20	16	19	17	20	1	11	14	13	21	18
12	14	12	10	11	21	20	18	2	20	15	11	14	11
11	5	12	9	13	22	13	9	3	10	6	15	25	12
10	6	6	14	6	10	10	9	1	6	4	12	14	6
9	1	8	8	4	13	14	3	1	1	5	17	15	6
8	2	3	3	3	5	4	4		3	1	4	6	1
7	1	5	3	3	2	2	3	2	6	6	3	9	2
6		4	3	1	1	2	3	3	2	2	1	2	1
5	3			1		2			1			3	1
4	3		3	1	1	1				3	1	6	
3			2							2	1	2	2
2			1		2					2		1	
1			1		2					1	1	1	
0		1			2					2		1	2
N.	196	265	326	212	341	316	288	44	209	202	243	400	227
Q_3	21	21	21	21	21	21	20	21	20	20	20	20	20
Mi	17	17	17	17	17	17	17	17	17	17	17	16	16
Q_1	14	14	14	13	13	13	14	12	13	13	12	13	13

Continued

45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	Total
															6
1															13
				1				1							38
1	2							1							40
	1							1		1		1	1		89
	2			4		1	1	2	1						151
			1	3	2	1	1	1			1		1	1	210
	2	1	1	5	1	2	1	2	3	2	2	2	1	1	291
4	1	2	4	7	3	1		2	1	2			2	2	400
2	5	2	4	10	4	8	4	5	4	2	1	1	3		475
5	10	5	4	10	2	10	4	6	5	6	6	4	5		609
5	11	9	10	21	6	9	13	10	7	6	6	10	5	3	769
10	15	7	20	24	8	10	9	10	8	11	5	7	3	1	866
9	17	7	24	31	11	16	13	24	11	10	11	16	5	3	953
10	16	8	25	28	16	15	19	18	9	15	9	13	9	6	1,073
12	17	14	24	37	17	20	16	24	14	18	18	7	8	4	1,053
21	25	7	26	36	28	20	30	28	23	19	18	20	14	11	1,133
8	26	12	32	44	31	28	30	26	24	26	21	25	6	12	1,144
10	21	23	33	42	25	23	24	36	24	25	29	30	14	9	1,121
12	17	13	35	51	26	30	43	33	25	25	22	28	8	8	1,027
16	18	16	26	46	32	18	26	42	39	20	29	25	18	12	924
9	22	19	34	35	17	27	20	28	31	22	20	37	10	5	851
11	15	15	22	37	21	21	20	27	33	24	23	22	12	10	750
4	15	8	22	25	11	20	25	22	14	20	20	28	15	9	602
7	15	9	17	23	14	15	12	20	30	26	14	17	13	11	483
4	7	4	9	20	12	18	19	20	19	14	17	21	13	13	427
7	10	3	9	8	3	5	10	15	3	13	16	13	12	6	247
7	10	1	10	10	2	4	11	13		15	10	17	7	5	213
1	4	2	3	9	4	3	1	7	1	4	5	5	6	5	126
4	2	2	2	7	2	4		1		6	4	5	5	4	99
	3			2		1	1	4		8	2	3	4	2	72
1			1	4	2			2		4	3	1	2	3	42
1	2	1	2		1		1				1	1	1	1	33
	2		1	2									3		22
	1			2		1	1	1		2		2		1	25
182	314	190	401	584	301	331	355	432	329	346	313	362	206	148	16,377
20	20	19	19	19	18	19	18	18	18	18	17	17	18	17	21
16	16	16	16	16	16	15	15	15	14	14	14	14	14	13	17
12	12	13	13	12	13	12	12	12	12	10	11	11	9	9	14



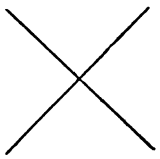
Graph I Frequency Distribution of the New Scale Scores.
Total of 59 Schools in Kobe. Sexes Compared.



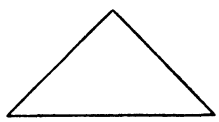
Graph II Frequency Distribution of the New Scale Scores.
Total of 59 Schools in Kobe. Sexes Combined.

2. The Pictures used in the Scale and the Percentage Passing.

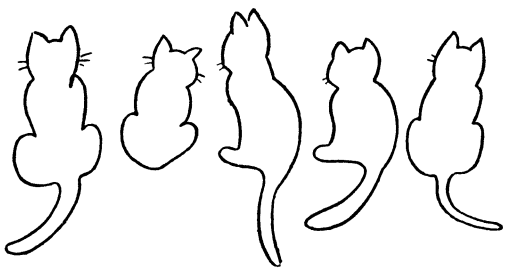
The pictures and the instructions used in the scale are as follows : —



1 Draw this.



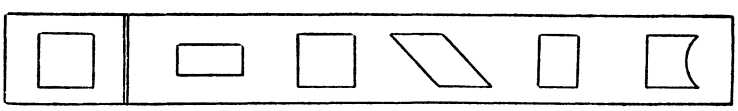
2 Draw this.



3 "How many kitties are there ? Count them with your finger".

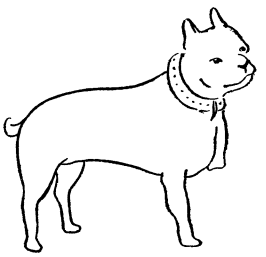
4 "Look at these pictures. Which is a doll ?"

5 "Here are some flags. Count them with your finger".

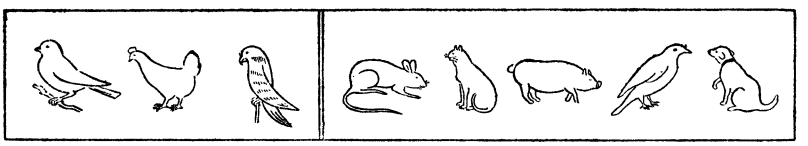


6 "Which is a square just like this ?"

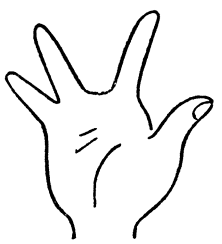
7 "Look at these pictures. Show me the picture of something that can run".



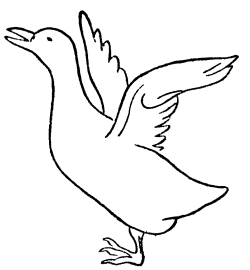
8 "Something is left out of this picture. Show me what is left out".



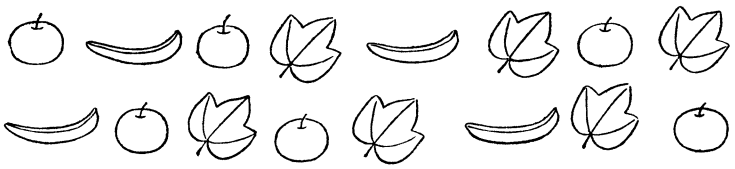
9 These three pictures are of the same kind of thing. Where is something of the same kind among these ?"



10 "Something is left out of this picture of a hand. Point with your finger to what is left out".

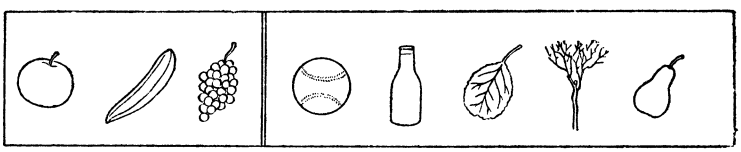


11 "Something is left out of this picture. What is it ?"

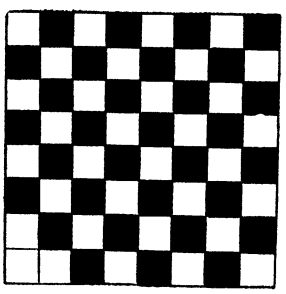


12 "How many apples and leaves are there all together ? Count them with your finger".

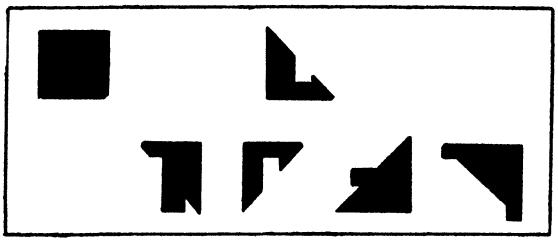
13 "Which is the picture of something that gives light and can be picked up ?"



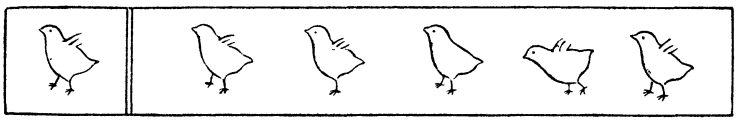
14 "These are the same kind of thing. Where is something of the same kind among these ?"



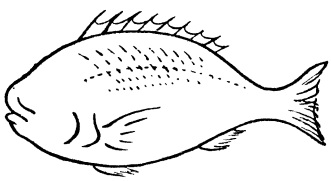
15 "There is something wrong with this picture. Where is the mistake?"



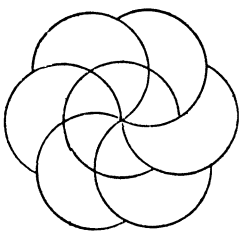
16 "Which one among these pictures will you have to fit into this one to make a square like this ?"



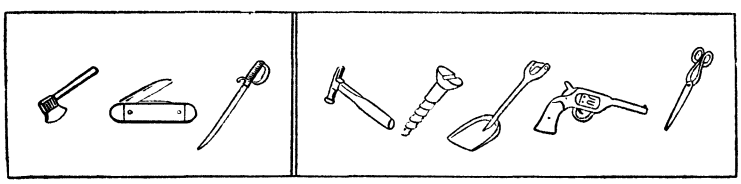
17 "Show me a chick just like this".



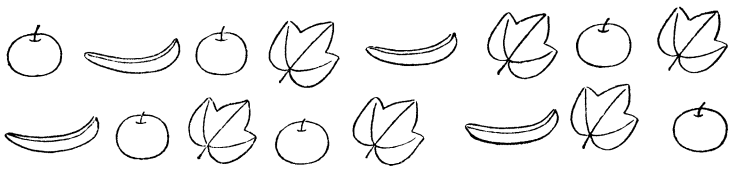
18 "Something is left out of this picture. What is it ?"



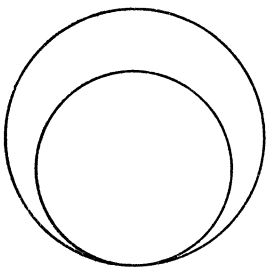
19 "Is there anything that is left out of this paper windmill ?"



20 "These three pictures are of the same kind of thing. Which is a thing of the same kind among these ?"

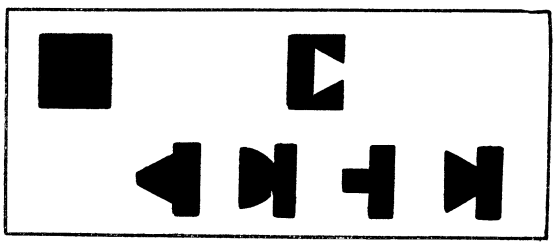


21 "How many apples are there that are between two leaves ? Point to them with your finger".

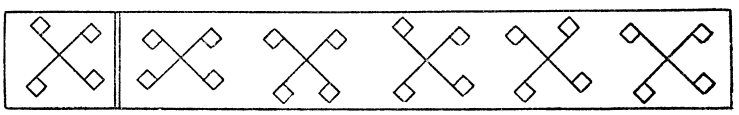


22 "Here are two circles, a large circle outside a smaller circle. Put your finger in the space that is in the large circle but not in the smaller circle".

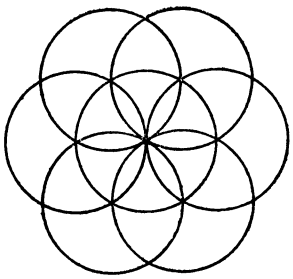
23 "Is there anything that is left out of this picture ?"



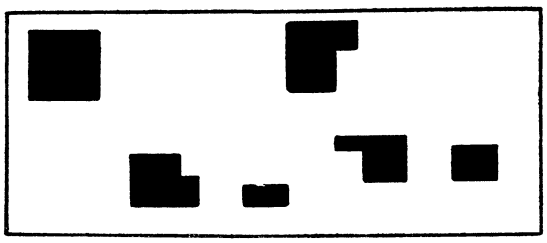
24 "Which one among these pictures will you have to fit into this one to make a square like this ?"



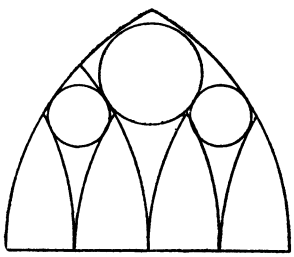
25 "Point with your finger to the picture like this".



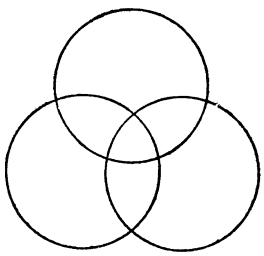
26 "How many circles are there ? Count them with your finger".



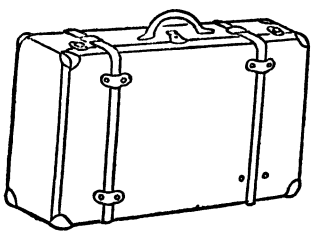
27 "Which one among these will you have to add to this one to make a square like this ?"



28 "Is there anything that is left out of this picture?"



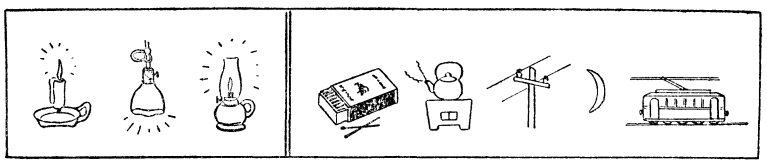
29 "Here are three circles. Put your finger in the space that is in all the three circles".



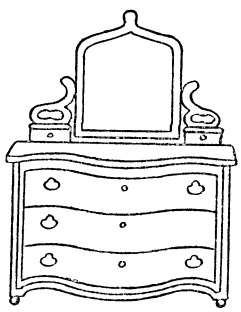
30 "Is there anything that is left out of this picture ?"

31 "There is one picture that shows something of a different kind from the others. Which is it ?"

32 "How many more chicks are there than eggs ?"



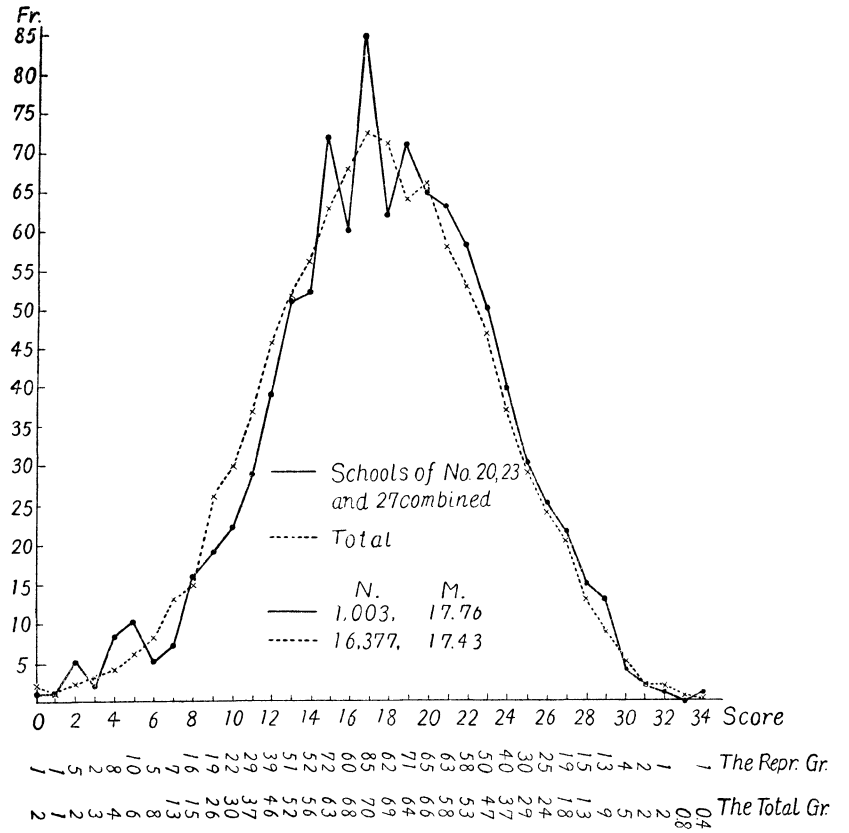
33 "These three pictures are of the same kind of thing. Where is something of the same kind ?"



34 "Is there anything that is left out of this picture ?"

In order to find out the degree of difficulty of each test item, we selected three representative schools — schools no. 20, 23 and 27 in Table VI. With these three schools we investigated the percentage passing each item. We can assume that the percentage of their passes represents that of whole groups, because the distributions of the two groups are very similar and their means are very

close, as shown in Graph III ; therefore the group we selected may represent the whole.



Graph III Comparison of Frequency Distributions of the Representative Group and the Total Group. (Indicated per 1000).

The percentage of passing of this representative group is as follows : — Table VII.

3. The Standardization of the mental age scale

We tried to calculate what the equivalent of the Binet Mental Age Scale was to our new test. In order to find out the equivalent by means of σ, we decided to use the result of J. Suzuki's Revision of the Binet Test, as it is the best standardized in Japan.

Table VII Percentage Passing Each Test Item.
C. A. 6 : 10—5 : 10

Test \ Sex / Case	Boys	Girls	Total
	515	488	1,003
1	95	91	93
2	95	87	91
3	92	89	91
4	90	91	91
5	91	88	90
6	88	82	85
7	84	83	83
8	80	74	77
9	75	68	72
10	72	67	70
11	68	63	65
12	60	57	58
13	57	53	55
14	57	51	54
15	53	48	51
16	54	46	50
17	52	45	49
18	55	42	48
19	47	46	47
20	50	45	47
21	36	51	43
22	42	39	41
23	34	40	37
24	41	34	37
25	37	33	35
26	36	32	34
27	36	30	33
28	33	33	33
29	31	31	31
30	25	28	27
31	29	23	26
32	29	22	25
33	19	19	19
34	14	10	12

J. Suzuki, "On the objective ground of Binet Scale measurement", 1936, p. 115. (鈴木治太郎： 智能測定尺度の客觀的根據)

The comparison of the corresponding age groups is shown in Table VIII.

Table VIII

Place	Scale	Case	Range of C.A.	σ
Osaka	Binet	2,509	6 : 9—5 : 10	12.8 months
Kobe	New	16,377	6 : 9—5 : 10	5.6 points

As the age groups are natural and not selected and each includes a considerable number of children, Mr. Suzuki's σ of Binet M. A. in his group may be taken as equivalent to our expected σ of Binet M. A. in our group. In our scale the σ of the scores is 5.6. Consequently one point in the score of our new scale corresponds to 2.3 months of Binet M. A. ($12.8 \div 5.6 = 2.3$).

The average chronological age of an unselected group ought to coincide with its average mental age. So we took the average chronological age of our group as its average mental age. Then the average mental age of our group is 6 years 4 months, and the score with this new scale 17.44. Therefore the score 17.44 corresponds to the mental age 6 : 4. 1 point in score corresponding to 2.3 months, as we indicated above, score 0.44 corresponds to I month ($1 \div 2.3 = 0.44$), and score 17 to 6 years 3 months ($17.44 - 0.44 = 6 : 4 - 0 : 1$). Now, therefore, score 17 is put equivalent to mental age 6 : 3, and this is made the starting point on which each score is translated to mental age, counting each point as 2.3 months. cf. Table IX — raw mental age.

Table IX Mental Age Norms for the New Scale

Score	Mental Age		Score	Mental Age	
	Raw	Revised		Raw	Revised
34	9 : 7	9 : 7	16	6 : 1	6 : 1
33	9 : 5	9 : 5	15	5 : 11	5 : 11
32	9 : 2	9 : 2	14	5 : 9	5 : 9
31	9 : 0	9 : 0	13	5 : 6	5 : 6
30	8 : 10	8 : 10	12	5 : 4	5 : 4
29	8 : 8	8 : 8	11	5 : 2	5 : 2
28	8 : 5	8 : 5	10	(4 : 11)	5 : 0
27	8 : 3	8 : 3	9	(4 : 9)	4 : 10
26	8 : 1	8 : 1	8	(4 : 7)	4 : 8
25	7 : 10	7 : 10	7	(4 : 4)	4 : 6
24	7 : 8	7 : 8	6	(4 : 2)	4 : 3
23	7 : 6	7 : 6	5	(4 : 0)	4 : 3
22	7 : 3	7 : 3	4	(3 : 9)	4 : 3
21	7 : 1	7 : 1	3	(3 : 7)	4 : 0
20	6 : 11	6 : 11	2	(3 : 5)	4 : 0
19	6 : 8	6 : 8	1	(3 : 2)	3 : 10
18	6 : 6	6 : 6	0	(3 : 0)	3 : 10
17	6 : 4	6 : 4			

The validity of this procedure is confirmed by the following two facts. First, according to Table IV with the Egeyama Kinder-

Graph IV Correlalion between the New Scale and the Binet Scale

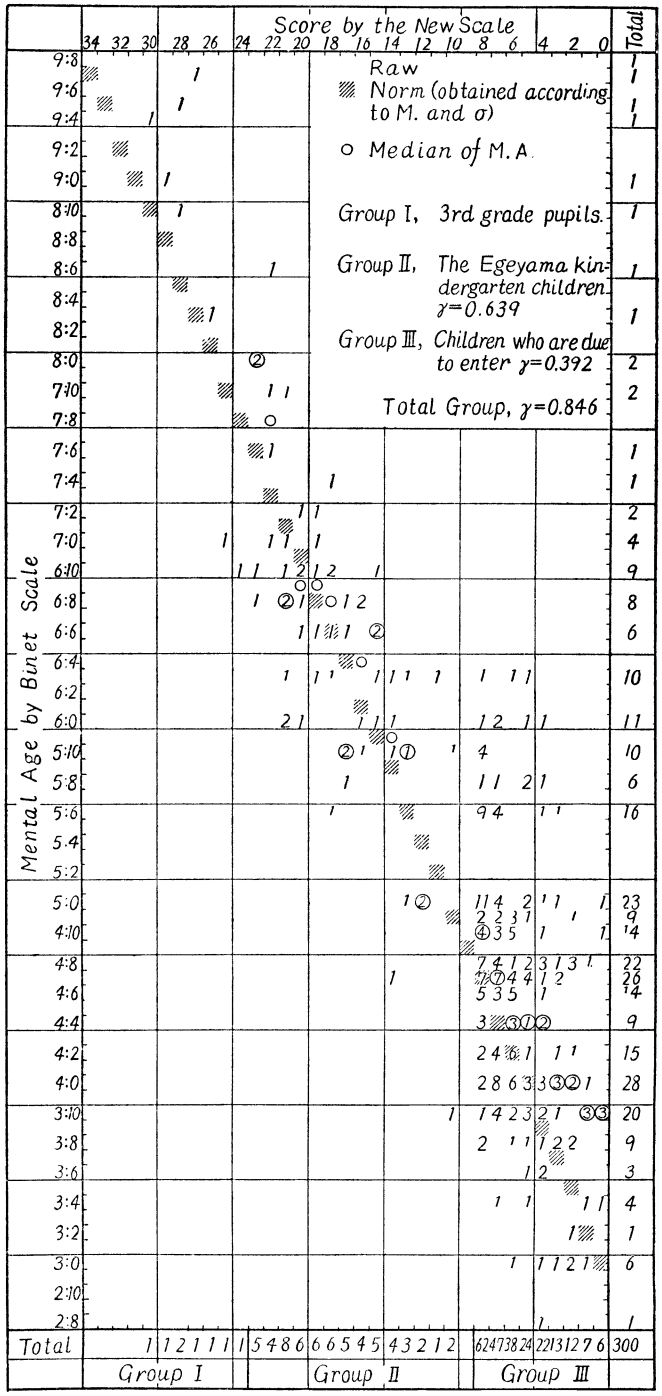


Table X The Extremely Backward Pupils

Comparison to Total	Course / Grade / Sex	Lower (Zinzyō) 1	2	3	4
The backward	Boys	161	164	96	101
	Girls	150	159	113	107
	Total	311	323	209	208
Total No. of Pupils		19,438	20,389	18,996	17,958
%		(3)1.60	(3)1.58	1.10	1.16
Total No. of Classes		375	375	358	333
Average in a Class		0.83	0.86	0.58	0.63

Note: 1. From the investigation by the Kobe Institute for Child Guidance in Juy, 1940.

2. Criteria for classifying the backward.

(A) Above the 3rd grade, classification was made according to the following table.

Grades enrolled	Course	Lower				Higher	
	Grade	3	4	5	6	1	2
Grades corresponding to the scholastic attainment	Reading	*1 : 2	2 : 1	2 : 2	2 : 3	3 : 1	3 : 3
	Arithmetic	1 : 2	1 : 3	2 : 1	2 : 2	2 : 3	3 : 1

* Note: "1 : 2" indicates the end of the 2nd term of the 1st grade.

(B) The 1st and 2nd grades.
Pupils showing an extreme backwardness in scholastic attainment and expected to make little improvement even under special individual instruction were selected.

3. Owing to the fact that we had different objective criteria for above the 3rd grade and below it, some discrepancy may have occurred.

4. The lower course is obligatory by law, but the higher course is voluntary.

garten children, the actual averages of the new test and the Binet Scale are 17.96 points in the former and 77.6 months in the latter. But by the above mentioned new norms 18 points become 77.3 months (17 points = 6 : 3 months = 75 months, 1 point = 2.3 months, therefore 18 points = 75 + 2.3 = 77.3 months). Therefore we see that the actual result and the calculation coincide very closely.

Secondly, the correlation between the new scale and the Binet Scale with three different groups of children was taken–viz.,

in All 72 Primary Schools in Kobe

			Higher (Kōtō)		
5	6	Totals	1	2	Totals
126	103	751	63	43	106
100	109	738	48	45	93
226	212	1,489	(4)111	(4)88	199
17,038	17,843	111,662	7,789	6,475	14,264
1.33	1.19	1.33	1.43	1.36	1.40
328	346	2,115	158	129	287
0.69	0.61	0.70	0.70	0.68	0.69

a few normal third grade children (Group I), Egeyama Kindergarten children (Group II), and those who got below 8 points in the new scale and had to be retested by the Binet Scale (Group III). The result is in Graph IV and Table IX.

γ with the second, third, and total is 0.639, 0.392, and 0.846 respectively. Table IX was corrected somewhat by the result of actual measurement. Since the retesting of children below score 8 in the new scale with the Binet Scale was carried out about a month and a half, on an average, after the administration of the new scale, each median of M.A. by the Binet Scale at points below 8 should be by a month and a half discounted. Then, the actual median M. A. by the Binet Scale at scores 8, 7 and 6 is about 4 : 8.5, 4 : 5.5 and 4 : 2.5 respectively. By considering these and other results we revised the raw mental ages corresponding to below 10 points obtained according to calculation of M and σ as the revised mental age in table IX.

At the upper end of the score, the number of cases is too small to make such correction, but we hope to do so later.

IV. Application of the results to practical problems

1. Detection of retarded children

In our country, all children who have reached the age of six by the 1st of April are required by law to enter a primary school.

However, blind, deaf, severely crippled or weak children are permitted to postpone their entry or are exempted from compulsory education by doctor's certificate. Their parents do not wish to have them educated in ordinary schools, and many of them are taught in special institutions. But, for the children retarded in intelligence, scarcely anything is done. Our city is no exception, and we have no institution for their protection and education. They are taught in the same class as ordinary pupils. According to the survey we made last year, we have at present a very great number of children who are extremely backward in attainment in ordinary classes, as the Table X shows. It is desirable to postpone their entrance for one or two years and wait until their intelligence grows, so that they may make better progress.

This was, in fact, the main purpose of our intelligence test. For this purpose, in the first place we selected the children who did not show enough growth in intelligence for the entrance by both the result of the simple test and teachers' opinion based on many year's experience, and in the second place, to make the result more exact, they were given the Binet intelligence test or some other complementary tests by the clinical psychologists. Thus we expected to make our diagnosis as exact as possible. In 1940, the First Grade Intelligence Test of Yokohama Institute for Child Study was adopted and this year our new scale was used. The test was carried out as follows : —

The extent to which the primay schools cooperated in this plan may be seen in the following table.

Table XI

	1940	1941
Schools not adopting our scale	14	3
Schools adopting our scale	48	59
Total	62	62

In 1940, the schools not adopting the simple test we recommended numbered 14 out of a total of 62 city schools, but this year there were three only. However, we found 27 schools which did not send to our institute any children whose score in our new

Table XII

	Schools	Children due to enter	
		Total	Desirable to be retested
None retested	26	6,796	349
Some retested	33	9,581	530
Total	59	16,377	879

Table XIII Children below 8 Points Retested by the Binet Scale in the Clinic

Schools	Total children tested	Below 8 points	Retested	%
No. 42*	243	12	12	100
,, 54	329	7	7	100
,, 33	265	14	14	100
,, 7	309	14	13	93
,, 40	209	12	10	83
,, 36	341	15	12	80
,, 32	196	9	7	78
,, 43	400	31	23	74
,, 56	313	41	29	71
,, 38	288	10	7	70
,, 15	453	12	8	67
,, 8	159	3	2	67
,, 37	316	11	7	64
,, 21	434	15	9	60
,, 27	285	23	13	57
,, 59	148	27	15	56
,, 44	227	9	5	56
,, 3	239	6	3	50
,, 58	206	40	20	50
,, 14	326	4	2	50
,, 51	331	18	9	50
,, 5	267	6	2	33
,, 41	202	19	6	32
,, 6	367	10	3	30
,, 23	304	15	4	27
,, 45	182	21	5	24
,, 28	214	6	1	17
,, 52	355	25	4	16
,, 26	323	7	1	14
,, 48	401	28	4	14
,, 4	221	9	1	11
,, 46	314	34	3	9
,, 20	414	17	1	6
Totals	9,581	530	262	49

* Note: School numbers correspond to the table VI c.

Table XIV Advice Given According to the Results of the Retest

Advice		Mental age yrs.-mos.	Case		
			1940		1941
			Before entrance	After entrance	Before entrance
Not necessary to postpone		7—9	0	0	0
		7—6	1	0	0
		7—4	0	0	0
		7—2	1	0	0
		7—0	1	0	0
		6—10	1	0	1
		6—8	1	1	1
		6—6	4	2	0
		6—3	4	3	4
		6—0	8	7	7
		5—10	15	4	5
		5—8	15	4	6
		5—6	22	1	19
		5—0	21(94)	3(26)	24(67)
Necessary to postpone	After postponement to be admitted into ordinary class	4—11	9	7	9
		4—10	15	5	15
		4—8	19	3	23
		4—7	16	2	26
		4—6	25	3	16
		4—4	19	3	9
		4—2	11	1	17
		4—0	32(146)	2(26)	32(147)
	Even after postponement to be admitted into special class	3—10	17	4	19
		3—8	7	2	11
		3—6	3	0	4
		3—4	4	2	4
		3—2	3	3	2
		3—0	4(38)	0(11)	6(46)
Necessary to be exempted	To be admitted into special institution	2—10	0	0	0
		2—8	0	0	1
		2—6	1	0	0
		2—4	1	0	0
		2—2	0	0	0
		2—0	1	1	0
		impossible	7(10)	0(1)	17(18)
Total	Fit for entrance		94(33%)	26(41%)	67(24%)
	Necessary to postpone		194(67%)	38(59%)	211(76%)
	Total		288	64	278

test was below 8 points and who were told to come to us for retesting so that we might make our final diagnosis to see if they were fit for entrance. cf. Graph II.

Since the parents usually comply with the teachers' advice if they are told to consult us, the fact that no one came to us may be interpreted as evidence that the school applied the test, but did not go on to cooperate further. In a word, it seems that about 40% of our schools did not realize the significance of our plan.

Next, in Table XIII we are able to see the degree of understanding of our plan on the part of parents themselves, who came to our institute by the teachers' advice. Table XIII shows the number and the percentage of children who came to our institute for retest. This number represents of those who were advised to do so. Among 9,581 children who were to enter 33 schools this year 530 had to be retested according to our standard, but only 262, namely 49% of them, complied with our request. In other words, about one half of both the schools and the parents cooperated with us.

Thirdly, the kinds of advice we gave to the parents after retesting, as to what to do according to the growth of their children's intelligence are shown in Table XIV, and the number of certificates for postponement of entrance issued at the request of the parents in conformity with our advice is in Table XV.

As we worked on approximately the same principle in 1940 and 1941 in regard to the retarded children before entrance, these two years may be compared as in Table XVI.

In 1940 the percentage of the number of parent who followed the advice was 41% and that in 1941 is 47%, a somewhat more satisfactory result. Moreover, comparing these with the result of 1939 (in Table XV) when no such positive plan was in operation, we see that the figures show some practical effect of our enterprise.

2. Detection of superior children

In the primary schools of our country, 90% of all the children who have ordinary intelligence are the main objects of education, and the remaining 10%, who include 5% very superior and 5% very inferior intelligence, are not properly considered. They are under the same instruction in the same class as the ordinary pupils. It is perhaps proper that in the primary schools in our educational

Table XV Number of Certificates for Delaying by the Kobe Institute

Year	Month of birth \ Month of issue \ Entrance	Before entrance							
		1	2	3	Total(%)	4	5	6	7
1939	4—12	lack	0	6	6 (55)	3	4	1	0
	1—3	lack	1	4	5 (45)	3	10	2	1
	Total	lack	**1**	**10**	**11** (100)	**6**	**14**	**3**	**1**
1940	4—12	11	8	9	28 (35)	9	6	3	0
	1—3	15	15	21	51 (65)	9	4	2	3
	Total	**26**	**23**	**30**	**79** (100)	**18**	**10**	**5**	**3**
1941	4—12	15	12	13	40 (40)	5			
	1—3	29	18	14	61 (60)	9			
	Total	**44**	**30**	**27**	**101** (100)	**14**			

Table XVI

	1940	1941
Cases retested	288	278
Necessary to postpone or to be exempted	194	211
Certificates issued	79	101
Delivery/Necessary (%)	41	47

system ordinary children, who constitute the majority, should be made the main object of teaching. But from the national standpoint the remaining 10% should certainly not be neglected, and taught indiscriminately with ordinary pupils, only because they are a minority. They must be given a proper chance according to their special needs. In order to remedy any defects of such educational system at present, we are giving advice to the children retarded in intelligence, and something must be done for the extremely superior

Entrance due to Intelligence Retardation Issued for Child Guidance

After entrance									Totals(%)
8	9	10	11	12	1	2	3	Total(%)	
0	3	1	0	4	0	0	0	16 (41)	22 (44)
0	2	3	0	2	0	0	0	23 (59)	28 (56)
0	**5**	**4**	**0**	**6**	**0**	**0**	**0**	**39** (100)	**50** (100)
0	2	0	0	2	0	0	0	22 (46)	50 (40)
1	1	0	0	6	0	0	0	26 (54)	77 (60)
1	**3**	**0**	**0**	**8**	**0**	**0**	**0**	**48** (100)	**127** (100)

children also. For this purpose we have made the following plan :

We shall take IQ 140 or above as the standard of such extreme superiority. First, such children must be selected, especially at an early period after their entrance to the primay school. Then, secondly, we shall, from that time forward until their graduation, be able to make enquiry into the following :

1. their hereditary background.
2. their developmental history up to the time of entrance.
3. their tastes, temperament and talent.
4. their physical condition.
5. their environment at school and at home.

Thirdly, on the basis of such investigations, a proper method will have to be devised, for example —

1. to help them to choose their career after graduation from the primary school.
2. to offer them help from an educational fund in case of necessity.

In the fourth place, as soon as they enter the primary school, such extremely superior children must be recognized systematically

every year, and treated suitably after investigation of their abilities, etc. Such extremely superior children were selected by our new scale.

In our result, the lower limit to include all above IQ 130 is 23 points in our score. The IQ of the children above this limit has been calculated (in Table XVII), and the distribution of their IQ above 130 at each school in our city is shown in Table XVIII.

All children of IQ 140 or above with the Binet Scale may be included almost without exception if we select IQ 130 or above by our new scale.

I wish to thank the Principals and teachers of the schools in which the test was made for their courtesy and their willingness to cooperate with us. I wish also to thank Mr. J. Kuwano, Principal of Irie Primary School and Chief of the Section of Child Study, Kobe, and the managing members of the Section for their cordial cooperation in carrying out our plan. I wish further to thank

Table XVII Frequency Distribution of the IQs above 130 within the Group of above 23 Points

I. Q.	Frequency		
	Boys	Girls	Total
162	1		1
161			
160	(1)		(1)
159	1		1
158	1		1
157			
156		1	1
155	2(4)	3(4)	5(8)
154		1	1
153		2	2
152	2		2
151	8	4	12
150	2(12)	1(8)	3(20)
149	8	3	11
148	5	3	8
147	11	3	14
146	13	7	20
145	14(51)	5(21)	19(72)
144	17	8	25
143	21	12	33
142	15	14	29
141	12	17	29
140	14(79)	5(56)	19(135)
139	45	27	72
138	47	35	82
137	57	40	97
136	37	30	67
135	49(235)	30(162)	79(397)
134	24	11	35
133	63	50	113
132	65	40	105
131	90	45	135
130	71(313)	68(214)	139(527)
Total	695	465	1,160

Table XVIII Frequency Distribution of the IQs above 130 for Each School, Kobe.

School \ I. Q.	130	135	140	145	150	155	160	Total	Total entrants	%
1	55	37	20	13	3	2	1	131	441	30
2	24	19	9	3	1	1		57	276	21
3	19	17	5	3	1	1		46	239	19
4	23	9	6	6				44	221	20
5	19	16	4	6	1			46	267	17
6	26	19	9	8	3			65	367	18
7	15	14	7	3	2	1		42	309	14
8	8	5						13	159	8
9	15	22	3	3	1	1		45	372	12
10	11	14	9	4	2			40	305	13
11	5	4	4					13	243	5
12	14	6	3	1	1			25	274	9
13	16	11	5					32	246	17
14	13	10	5	3				31	326	10
15	15	10	3	1		1		30	453	7
16	1							1	17	6
17	5	4						9	118	8
18	16	15	7	3	2			43	403	11
19	8	4		1				13	245	5
20	10	14	5	3				32	414	7
21	21	9	3					33	434	8
22	4	3	1			1		9	141	6
23	13	9	4	1	1			28	304	9
24	6	6		1				12	171	7
25	6	6						13	261	5
26	7	7						14	323	4
27	10	12	2					24	285	9
28	6	5	1					12	214	6
29	5	4	1	1				11	260	4
30	7	3	2					12	222	5
31								0	4	0
32	4	5	2	1				12	196	6
33	8	3	2					13	265	5
34	9	5	2					16	326	5
35	8	3						11	212	5
36	12	8	2	3				25	341	7
37	8	5						13	316	4
38	8	5						13	288	5
39								0	44	0
40	5	4	1					10	209	5
41	5		1		1			7	202	3
42	5	3		2				10	243	4
43	5	6	1					12	400	3
44	4	4						8	227	4
45	2	2	1	1				6	182	3
46	4	3			1			8	314	3
47	1	1						2	190	1
48	3		1					4	401	1
49	12	5	1	1				19	584	3
50	1	3						4	301	1
51	3	4						7	331	2

Table XVIII Continned

School \ I. Q.	130	135	140	145	150	155	160	Total	Total entrants	%
52	3							3	355	1
53		8	1					9	432	2
54	2		1					3	329	1
55	6							6	346	2
56	1	1						2	313	1
57	2	2						4	362	1
58	2	2	1					5	206	2
59	1	1						2	148	1
Total	527	397	135	72	20	8	1	1,160	16,377	7

Mr. J. Awau, Prnicipal of Hiyodorigoe Primary School and Mr. S. Kuriyama, Principal of Sinyō Primary School, for their goodwill in offering us the preliminary test data obtained from their school pupils; and I am also grateful to Mr. N. Ōnisi, a clinical psychologist of our Institute at that time, for carrying out the greater part of the Binet test. Lastly I am obliged to Prof. M. Imada, of the Kwansai Gakuin and Mr. Ed. Gatenby for their kindness in correcting the English of this paper.

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